aihaozhe

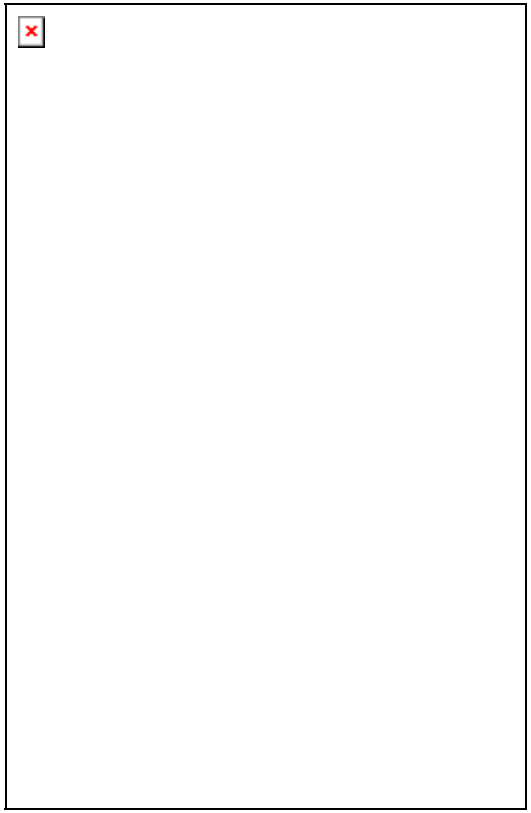
Fan **Series Handheld Digital Scopemeter (Oscilloscope)**

ZB-2201 Handheld Digital Scopemeter
ZB-2201S Handheld Digital Oscilloscope

User manual

www.aitendo.co.jp

Appearances of ZB-2201S Handheld Digital Oscilloscope



Appearances of ZB-2201 **Handheld Digital Scopemeter**

Dear user:

Thanks for your choice of Fan Series portable digital Scopemeter（Oscilloscope）made by us. The **Scopemeter**（Oscilloscope） serves and accompanies you at any time tending to offer a swift and high-efficiency work.

The instruction is to introduce systemically you how to use it as well as concerned notices, please read it carefully prior to use. In this instruction, we provide and cause the product display consistent with real product as far as possible, if any differential, the real display of machines will govern.

We assure the Function and specification in accordance with the instructions noticed which is suitable for Fan Series.

Accompanied with host machine a product warranty card is given. Please fill in it carefully. We will provide you limited service(such as change， maintain ， repair)according the content .

Thanks ！

Notices

★Make sense of the instructing contents in this Instruction correctly;
★The 4AH lithium polymer battery built in the Scopemeter（Oscilloscope） shall use the built-in dedicated charger rather than any other charger or DC source adapter to avoid the occurrence of hazard.
★ Please pay attention to the range of input voltage so as to prevent from the damage of instrument.
★ Never set the Scopemeter（Oscilloscope） in an unstable stand or table to avoid of a falling down and subsequently resulting in the damage of products.
★ Never set the Scopemeter（Oscilloscope）nearby the hot body to prevent from damage of instrument due to superheating.
★ The liquid substance is forbidden to flow into the Scopemeter（Oscilloscope）.
★ Never set the Scopemeter（Oscilloscope） under a heavy load.
★ Never use the liquid or gas detergent, but a dry cloth for cleanness is available.
★ Make sure of it is fully charged before a long time in storage, turn off the host machine you can get a quick charge.
★If the Li-polymer battery need a change, please contact us from the way listed at the back cover.

Catalogue

Chapter I 1
1.1 Unpacking for check 2
1.2 Introduction to product 2
1.2.1 Function 3
1.2.2 Characteristics 3
Chapter II 4
2.1 Charge 5
2.2 Power on 5
2.3 System configure or automatic 10
2.3.1 Setup of automatically measured option 13
2.3.2 Saves setup 13
2.3.3 Select or setup of channel 14
2.3.4 **Channels run/stop** 15
2.4 output of waveform for test 16
2.5 power off 16
Chapter III 17
3.1 setup of vertical system 18

3.2 Setting of horizontal system 22
3.3 Mathematical operation function 24
3. 4 **Automatic measurement functio**n 26
3.5 Save function 32
3.6 REF function 33
3.7 Trigger function 36
Chapter IV 39
4.1 voltage measurement 40
4.2 Resistance measurement 41
4.3 Capacitor measurement 42
4.4 Make-and-break measurement 43
4.5 Diode measurement 43
4.6 Current measurement 44
Appendix 46
Appendix A main specification 47
Appendix B Problem and resolutions: 53
Appendix C Standard layout 55
Appendix D Definition of interface 56
Appendix E Instruction of the PC software for the Scopemeter 58

Chapter I

Introduction

1.1 Unpacking for check

As for a new Fan Series portable digital Scopemeter（Oscilloscope）, please have a check following the procedures below:

1.1.1 To checks whether or not there exist damage due to transportation.

If any damage happens to packing box or foam protective mattress, please keep it and contact with the salesman.

1.1.2 Check of accessories

The accessories which have been explained in the Instruction Manual shall be checked whether or not they are missing or damaged, if any, please contact with the salesman.

1.1.3 Check of complete machine

If any damage happens to the appearance of instrument or malfunction occurs, please contact with the salesman. Please keep the packing if any damage is caused in transportation.

1.2 Introduction to product

Fan Series portable digital Scopemeter（Oscilloscope） is manufactured in accordance with the requirements of research, development, production, debugging and repair of majority electronic engineers. It integrates the functions of both oscillograph and multi meter. In contrast to a traditional one, it has a built-in lithium battery and can work without an external power supply; it is convenient for moving, especially for in situ application; it has multi trigger types, including automatic, common and single trigger , capable of locking and subsequently storing the non-periodicity signals which a traditional one fails to probe; it features compactness, speciously, friendly interface, equipped with RS-232 lines of communication and PC software which can transfer the waveform to PC machine for

the purpose of data analysis or compiling into document.

Fan Series portable digital Scopemeter（Oscilloscope） may swift and accurately detect the faults happening to circuit, serve as an electronic engineer's right hand, and will surely bring you a great convenience in work.

1.2.1 Function

★ Functions of Scopemeter

★ Fifteen kind of waveform measure directly

★ Function of storage and communication

★ Function of multi meter (only zb2201 has the function)

1.2.2 Characteristics

★ 320×240 high resolution display, larger information capacity, more visually

★ Use a big-capacity lithium battery to supply power; the host machine can be hung; there are multi displacement means such as supported by a stand, gripped by single hand, convenient for application in various fields.

★ Waveform and waveform parameter can be displayed simultaneously on a screen, 15 parameters can be displayed, such as max. Value, min. value, means value, mean square root，peak to peak value，periodicity，frequency， positive pulse width, negative pulse width，rise time，fall time

★ It has an automatic setting function to set automatically time base and amplitude range.

★ To display the menu in Chinese (English), easy to operate

★ It is of compactness（118mm ×200mm ×45mm）, and in light weight (host machine ＜ 0.7 kg)

Chapter II

Fundamental operation for start up/power off

2.1 Charge

10 hours of charge shall be ensured when it is charging for the first time, after that, 6 hours once is enough. The host machine shall be power off when charging, (or else it is harmful to the battery).

2.2 Power on

The keyboard for **Scopemeter（Oscilloscope）** is showed in Figure 1 listed below, the functions concerned are given in the following table:

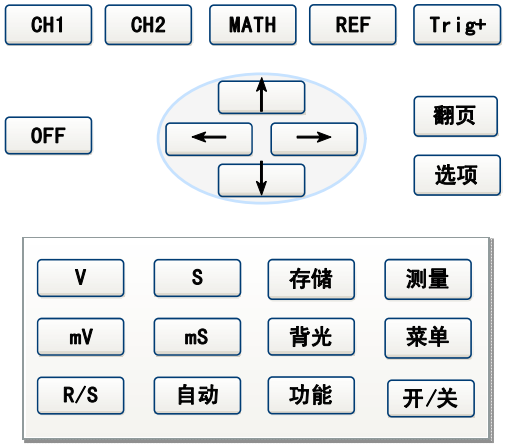
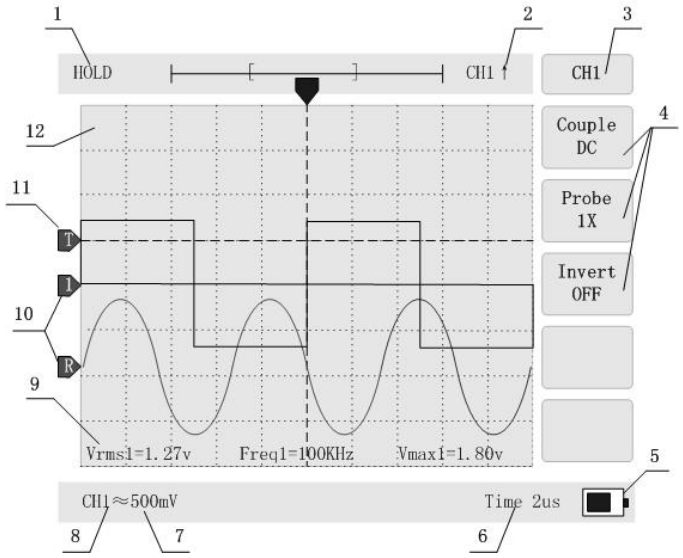


Figure 1:**Keyboard of Scopemeter**

Keystroke	Function
CH1	Open Channel I
CH2	Open Channel II
MATH	Open Math Display Channel
REF	Open Reference Waveform Channel
OFF	Close display channels above
V、mV	Change vertical amplitude
S、和 mS	Change horizontal time base
存储=Save	Open “SAVE” menu
背光=Backlight	It is allowed to open/close backlight
功能=Function	Capable of displaying function menu
菜单=Menu	To display other setting options
R/S	Run or lock in some waveform
自动=Auto	To automatically display a fit wave-form
开/关=Power on/Power off	To start up/close down host machine
测量=measure	To display measure options
翻页=**Page down**	used to select menu option
选项=**Enter**	used to select expected option

Keyboard table of Scopemeter

Press "开/关" key to open Scopemeter（Oscilloscope） and the startup interface is first given; then press any key or wait for several seconds, subsequently, the oscilloscope interface is automatically given, as in Figure 2.



1. Run or hold;
2. Types of trigger
3. Function interface
4. Current menu option
5. Charging status
6. Time base
7. Amplitude shift
8. Opening channel and couple status
9. Automaticly measured option
10. Channel position
11. Trigger signal position
12. Grid marks waveform

Figure 2：Interface of Scopemeter

This interface consists of three sections, the main section refers to the waveform display, the right section refers to the setting section, the below section refers to the status column.

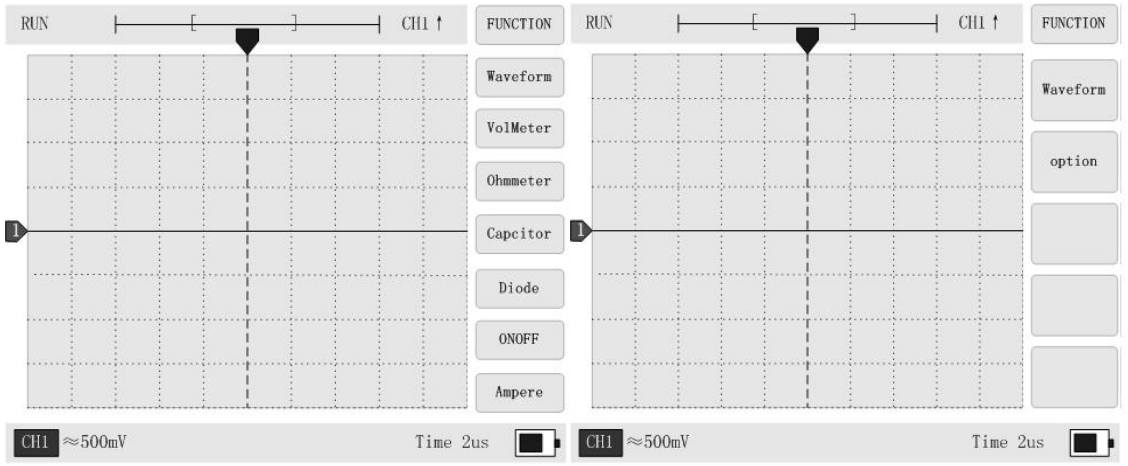
Waveform display section is involved in the grid, waveform, the needle indicating the position of waveform, the identification when waveform is at scanning mode as well as the measurement parameter group the user chose. Every 25 display points produces a grid, the lateral direction refers to time axis, with range of X s / div , X us / div or X ns / div per grid, while the longitudinal direction refers to amplitude axis, with range of X V / div , X mV / div per grid. The arrowhead with number or letter indicates the zero of amplitude of waveform. 1 means the first channel, and 2 the second channel; M means the channel of calculation valve. R means the reference waveform channel, the “RUN” or “HOLD” on the above left means the waveform is in scanning position or has been locked in. The parameters to be measured, as measurement signal’s periodicity, amplitude, peak value, Root mean square value mean, mean value, can be displayed near to the bottom of grid in accordance with the selection of user.

The second section is **setting section**, the input coupling types such as DC, AC , ground, attenuation multiple of probe, display of positive and negative phases. may arrange by yourself in accordance with the requirements

The status column tells the channel of measurement, input types of each channel, the channel selected currently, (the channel selected shall be displayed using reverse color, namely white foreground against black background, but the unselected shall be displayed normally, namely

black foreground against white background.), amplitude and arrange of each channel, horizontal time base, electric quantity of lithium battery as well as current time.

After power on, press the "功能"(function) key to open the function selection interface, as in Figure 3, and the functions cover oscilloscope, resistance, diode, current, setting, as well as language options. Pressing "翻页"(Page down) key may change the setting option, while pressing "选项"(enter)key to perform the function selected. The last option may change the display for language (Chinese/English) of oscilloscope, and the functions will be presented in the following other text.



ZB-2201 ZB-2201S

Figure 3: Function interface

2.3 System configure or automatic

The purpose of the system configure is to give an optional setting arranged by user yourself, Then you can do you work easily. All you need to do is that set up you host machine. And then save it immediately. So it appears the status you set next time it power on. Such as amplitude, time

Backlight, language, options of measure etc, some is listed below:

Press “菜单”(menu)key to display the menu (figure 4), then press“翻页”(page down)key select some option you need, press“选项”(enter)to perform it 。

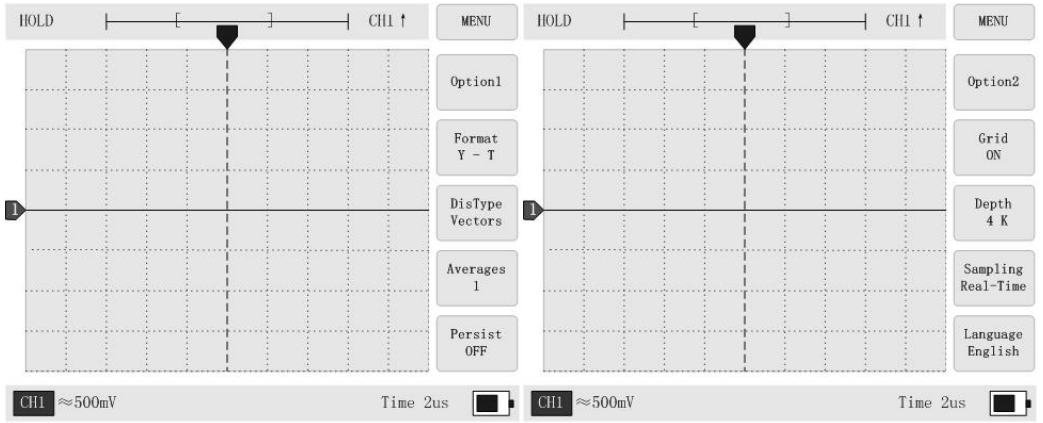


Figure 4: Menu interface

The menu will be displayed by pressing the “菜单”(menu) key, as shown in Table below.

Table 2

Function menu	Option	Description
Time format	Y-T	y-t mode shows the relative relation between vertical voltage and horizontal

	X-Y	time. x-y mode shows the amplitude of Channel 1 on the horizontal axis, and shows that of Channel 2 on the vertical axis.
Display type	Vectors Dots	Displayed by tie-line between sampling points To display sampling points directly
Average	1、2、4、8、16、32、64	To set the average sampling time by pressing “Enter” key, from 1 to 64，advancing by multiples of 2 step by step
Persist	On Off	To open the waveform retaining function To close the waveform retaining function
Grid	On Off	To display the screen background grid To close the screen background grid
Sampling	Real-time	The sampling mode is set as real time sampling
Language	简体中文 English	To set up the language displayed on the screen

Options set up directly by the key ：

Turn on the backlight or turn off the backlight，press the key “背光”（“backlight”）；

horizontal shift is controlled by “S” or “mS”; vertical shift is controlled by “V” or “mV”。

Automatically measured option can be select from the Measure Menu, detailed information is listed below

2.3.1 Setup of automatically measured option

host machine setup the amplitude and the time base automatically, so as to suit for the observation, when the “自动”(auto)key pressed, it start to schedule.

Options listed below maybe set by the host machine:

Table 3

Function	Setup
Display format	Y-T
vertical “V/div”	Adjustment to a proper division
Vertical division adjustment	Coarse adjustment
Signal inversion	Close
Horizontal position	Center
Horizontal “S/div”	Adjustment to a proper division
Trigger type	Edge
Trigger source	Automatically detect the channel that has signal input.
Trigger level	Midpoint setting
Trigger mode	Automatically

“R/S”：Run or stop waveform sampling.

2.3.2 Saves setup

The method mentioned above can be an easily way to use the host machine.

When you have setup the option you want to setup, you can save it, for the use of next time, or leave it without save, made it be same as before.

If you want save it, you can press the key "存储" (save) to enter the save menu, press"选项"(option) set the storage type as "设置" (set), then press"翻页"(page down)to select the "保存" (save), press the "选项"(enter)to save the parameter.

2.3.3 Select or setup of channel

The CH1/CH2 means the channel for input signal, and the MATH or REF has the similar conception as CH1/CH2, so you can think it to be another channel when operate on the MATH or REF.

If you want some channel to be open for you, you can press the key correspond (CH1, CH2, MATH, and REF).

After that, you can select the channel to be closed, made it the status selected, and then press OFF to close it.

Table 4

Types of channel	status	状态标志
通道 1（CH1）	Open	CH1（white against black）
	Selected	CH1（black against white）
	Closed	Nothing displayed
通道 2（CH2）	Open	CH2（white against black）
	Selected	CH2（black against white）

	Closed	Nothing displayed
数学运算（MATH）	Open	Math(white against black)
	Selected	Math（black against white）
	Closed	Nothing displayed
参考波形（REF）	Open	Ref（white against black）
	Selected	Ref（black against white）
	Closed	Nothing displayed

Application of Vertical system（↑, ↓, V and mV）

1. the key ↑ or ↓ is set to adjust the vertical position of channel, and the DPI is changed with the vertical shift.
2. "V" or "mV" is set to adjust the vertical DPI for all the channel, If the channel is open.
3. Only the opening channel (namely selected) can be adjust by the key ↑ , ↓ ,V or mV . And the waveform of REF is adjust based on the condition it saved.
4. The information on the left (such as "POS=8") has the same color of channel, and marked with "V", when the vertical system is being adjusted. The unit of MATH is dot at this time, it is different with other.

2.3.4 Channels run/stop

As a input channel CH1/CH2 samples continuous or stop at the position for a observation, this can be done by pressing the key R/S or determined by the host machine(if the machine is set to the

trigger mode)

NOTICE:

On the condition that the R/S (run or stop) pressed (namely the machine in the HOLD status), the vertical system also can be adjusted (zoom in /zoom out) to some extend.

2.4 output of waveform for test

A 1 kHz/1v waveform is provided at the top of the Scopemeter, it is a ring where you can get the signal easily with the probe. The ground of it is connected with main board, you can have a measure without extra ground, and it provides a continuously output.

2.5 power off

When you have finished you work, you can power off the machine with the key 开/关 (power off/power on). When the battery goes out you can use the machine by the charged directly or fully charge the battery again. But it is better to fully charge the battery, or else it is harmful to the battery.

Chapter III

Function of Scopemeter

On the initial status, the machine displayed as figure 2. or else please press the key “功能”(function) to enter into the function menu, then press “翻页”(Page down) to select the top, and press “选项”(enter) to return the initial interface.

Before using the machine, it is better have a setup of the vertical system or the horizontal system to get a steady and clear waveform, sometimes trigger also need to be have a setup. You can do it as follows:

3.1 setup of vertical system

3.1.1 Couple of CH1/CH2

Press the key “ CH1 “or” CH2 “to select the channel, it displayed as below,

Table 5 Couple of channel for measure

Function menu	set	description
Couple	AC	Without DC parts
	DC	All the signal
	Ground	Without any signal outside
Probe	1X	Set it to the appropriate one as your probe set
	10X	
	100X	

	1000X	
Invert	ON	Display in an opposite phase
	OFF	Display in normal

Press “CH1” or “CH2” key, the system will give the operation menu for “CH1” or “CH2”, the description concerned please is shown in Table 1:

For instance, the measured signal for CH1 refers to a sinusoidal signal containing direct current biasing.

Press “CH1” key to enter the interface of CH1, then press “翻页” (Page down)key to coupling option, in the end, press “选项”(option) key to select the AC option so that the AC coupling type is set. The direct-current component contained in measured signal is obstructed. The waveform display is given in Figure 7

P Press “CH1” key to enter the interface of CH1, then press “翻页” (Page down)key to coupling option, in the end, press “选项”(option) key to select the DC option so that the DC coupling type is set. All the signal will be get. The waveform display is given in Figure 8.

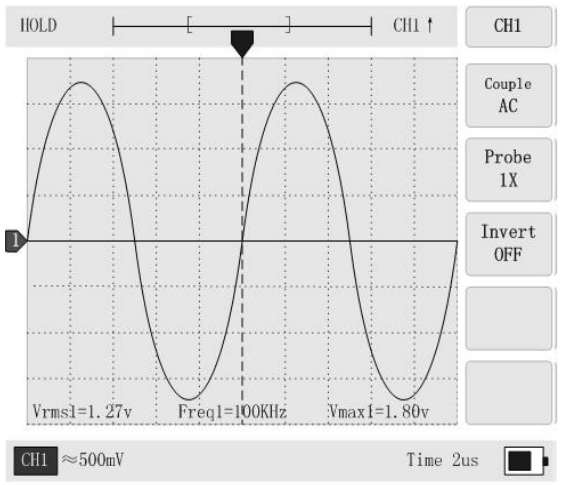


Figure 7 ： Interface of CH1 on AC status

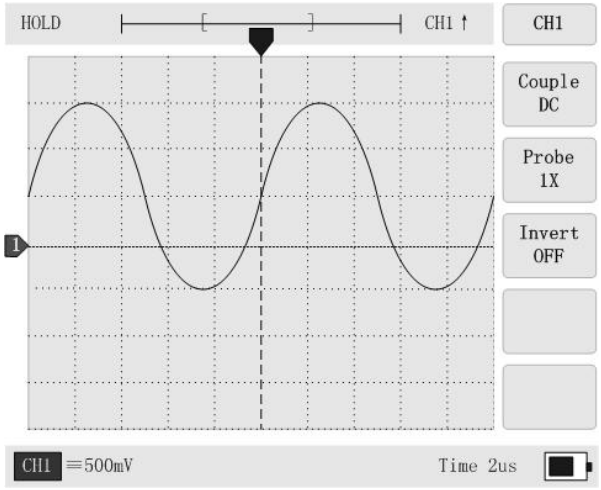


Figure 8： Interface of CH1 on DC status

Press “CH1” key to enter the interface of CH1, then press “翻页” (Page down)key to coupling option, in the end, press “选项”(option) key to select the GROUND option so that the GROUND coupling type is set. No signal outside will get. The waveform display is given in Figure 9.

Vertical scale adjustment will be done by pressing “V” and “mV” key, the vertical sensitivity ranges from 2mV to 5V. The coarse adjustment is done in 1, 2, 5 in sequence to define the vertical

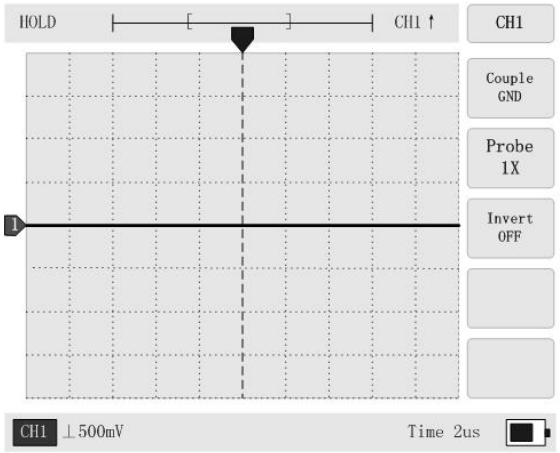


Figure 9： Couple set to ground

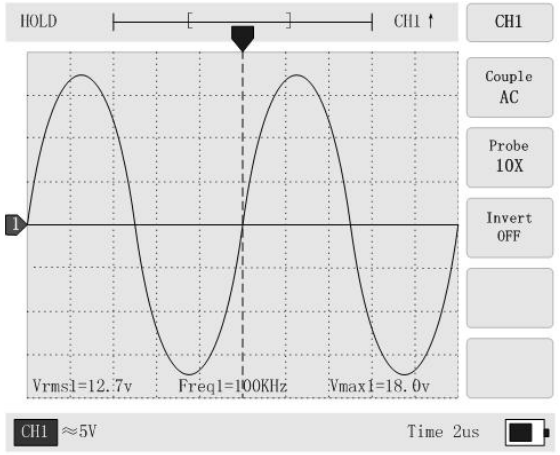


Figure 10：waveform with probe set10:1

scale sensitivity, namely by 2mV、5mV、10mV、20mV、50mV……5V step by step.

Proportion of adjustment probe

Corresponding to the attenuation coefficient, we shall make a corresponding adjustment of the probe attenuation proportion coefficient in channel operation menu. For example, when the attenuation coefficient of probe is 10:1, the proportion of input channel of oscilloscope shall be set to 10X so that the scale displayed is consistent with the measures data.

The demonstration given in Figure 10 refers to the setting when the probe of 10:1 is applied and

shall be indicated by vertical scale.

Press “CH1”key to open the CH1 display interface, then press “翻页” (Page down) key to probe option, and then press “选项”(enter) key to select probe proportion, respectively as 1X, 10X, 100X and 1000X. Please refer to Table 6.

Table 6

Probe attenuation coefficient	**Setting of corresponding menu**
1：1	1X
10：1	10X
100：1	100X
1000：1	1000X

3.1.4 Inversion setting of waveform

Waveform in inversion: The signal displayed is relatively inverted to 180 °with electric potential, as in Figure 10 and Figure 11. Press CH1 key to open CH1 display interface, press 翻页 key to inversion option, press 选项 key to select the starting up/closing down of inversion.

3.2 Setting of horizontal system

3.2.1 Horizontal control knob

The horizontal control knob can be used to change horizontal time base, the location of current

waveform in memory (memory displacement) and the location of triggering in memory (triggering displacement). The horizontal center of screen is the time reference point of waveform. The waveform will expand or contract relative to the screen center, if the horizontal scale is changed. The change of horizontal position can change the waveform position relative to a trigger point.

Key ← and →: the two keys can be used to adjust the horizontal position of channel waveform (including mathematical operation). The analysis degree of this control knob changes with that of the time base.

Key S and mS: the two keys can be used to adjust the main time base, i.e. S/div.

Sign description:

1. "[ ]"represents the position of current waveform window in memory.
2. Arrowheads indicate the position of a trigger point in memory.
3. The horizontal time base (main time base) is indicated in S/div.

Terminology explanation

Y-T mode: in this mode, axis Y shows amplitude, and axis T shows time.

X-Y mode: in this mode, axis X shows the amplitude of Channel 1, and axis Y shows that of Channel 2.

Operating description

The menu display interface (as shown in Figure 14) can be opened by pressing the "Menu" key, and the setting option s can be changed by pressing the "翻页" (Page down)key, then the setting

content can be changed by pressing the “Option” key.

3.3 Mathematical operation function

The mathematical operation (MATH) function is to display the results of waveform addition, subtraction, multiplication, scale and FFT operations between CH1 and CH2 channels. Meanwhile the results of mathematical operation can be similarly measured by grid.

The amplitude of operation waveform can be adjusted by Key “V” and “mV”, and it is indicated in percentage.

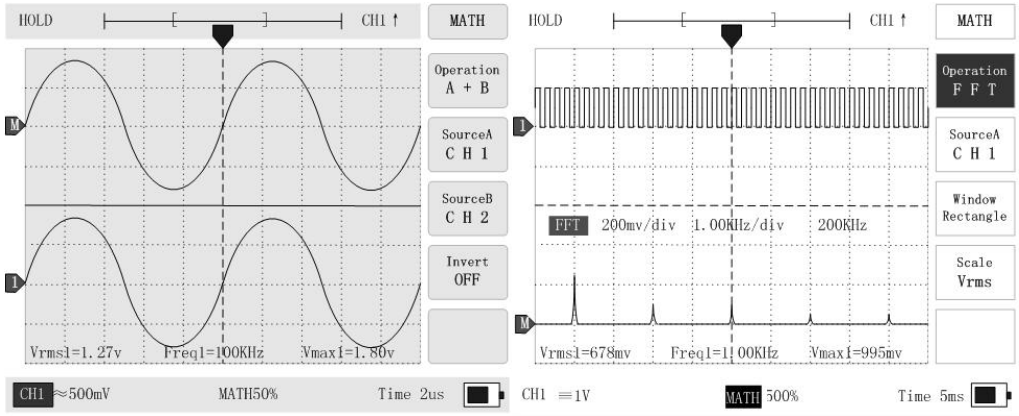


Figure 12 Display of Mathematical Operation Display of FFT

The amplitude ranges from 0.1% to 500% in 1, 2, 5 in sequence, i.e. 0.1%, 0.2%, 0.5% ……500% step by step.

The “MATH” display interface can be accessed by pressing the MATH key, and the setting option can be changed by pressing the 翻页 key, then the setting content can be changed by pressing the 选项 key. The menu functions are shown in Table 7.

Table 7

Function	Setting	Description
Operation	A+B	Waveform addition of source A and B
	A－B	Waveform obtained by the subtraction of source B
	A*B	Waveform obtained by using source A multiples source B
	A/B	Waveform is obtained where source A is divided by source B
	FFT	FFT spectral analysis display
source A	CH1	To set source A as CH1 channel
	CH2	To set source A as CH2 channel
source B	CH1	To set source B as CH1 channel
	CH2	To set source B as CH2 channel
Invert	Open	To open the waveform inversion function for math-metical operation
	Close	To close the inversion function

Figure 12-1 FFT Display Interface

When the FFT function is selected, the interface will be displayed in two parts, as shown in Figure 12-1. Thereof, the upper part displays channel waveform while the lower part displays the result of FFT frequency spectrum. “ source A” can be used to select FFT channels, and the key “frequency band” can be used to display all the results of FFT. The high frequency displays the part of high band, while the low frequency displays the part of low band, in this way, it can be expanded horizontally for observing the results.

Table 8

Function	Setting	Description
Operation	FFT	FFT spectral analysis display
source A	CH1 CH2	To set source A as CH1 channel To set source A as CH2 channel

3. 4 Automatic measurement function

Press 测量(measure) key to open the measurement interface where the signal measurement is classified into Signal 1, Signal 2 and No measurements. Press 翻页(Page down) key to select the signal option, then press 选项 (Option) key to select Signal 1, Signal 2 and No measurement in turn. Signal 1 and Signal 2 menu will give three interfaces as in Figure 15, 16, 17 while No measurement menu will give an interface as in Figure 18.Figure 15

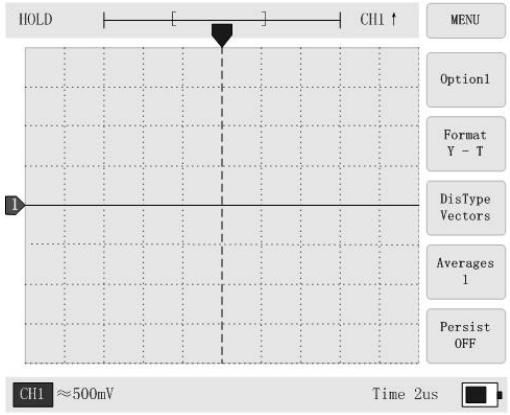


Figure 15：Measurement Interface I

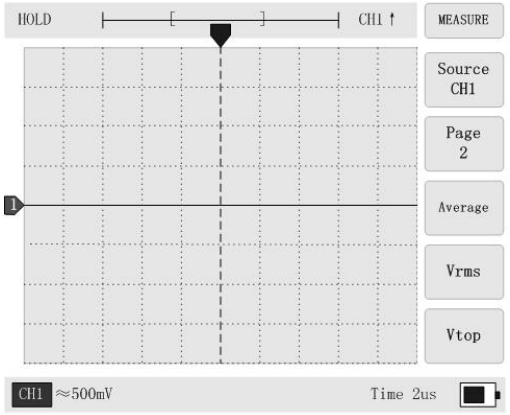


Figure 16 Measurement Interface II

Page 1 is shown in **Table 9：**

Function	**Setting**	**Description**
Peak to Peak value	Measurement No measurements	To measure the peak to peak value of signal
Maximum	Measurement No measurements	To measure the maximum of signal
Minimum	Measurement	To measure the minimum of signal

	No measurements	
Mean value	Measurement No measurements	To measure the mean value of signal
Root mean square	Measurement No measurements	To measure the root mean square of signal

Page 2 is shown in **Table 10**:

Function	**Setting**	**Description**
Top value	Measurement No measurements	To measure the top value of signal
Bottom value	Measurement No measurements	To measure the bottom value of signal
Frequency	Measurement No measurements	To measure the signal frequency
Cycle	Measurement No measurements	To measure the signal cycle

Positive pulse width	Measurement No measurements	To measure the positive pulse width of signal

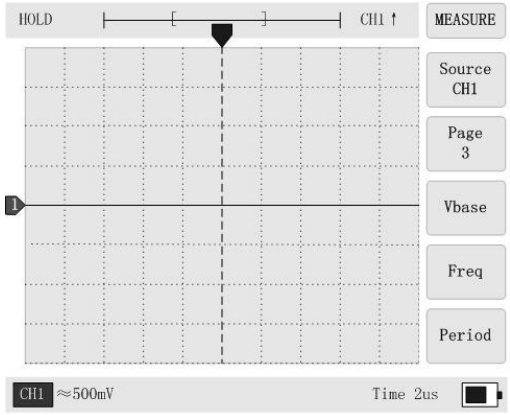


Figure 17 Measurement Interface III

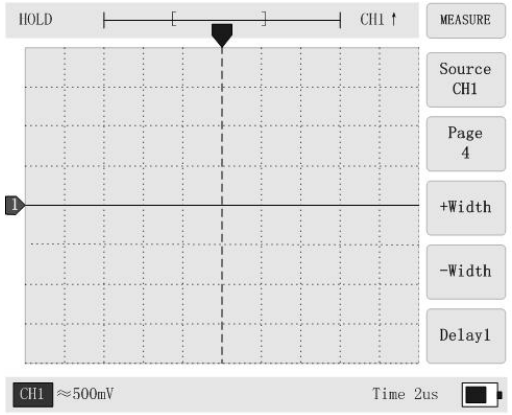


Figure 18 Measurement Interface Ⅳ

Page 3 is shown in **Table 11**:

Function menu	Setting	Description

Negative pulse width	Measurement No measurements	To measure the negative pulse width of signal
Delay 1	Measurement No measurements	To measure the signal delay 1
Delay 2	Measurement No measurements	To measure the signal delay 2
Rise time	Measurement No measurements	To measure the rise time of signal
Drop time	Measurement No measurements	To measure the drop time of signal

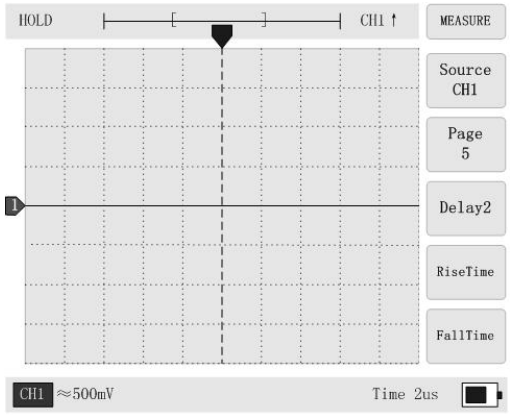


Figure 19 Measurement Interface Ⅴ

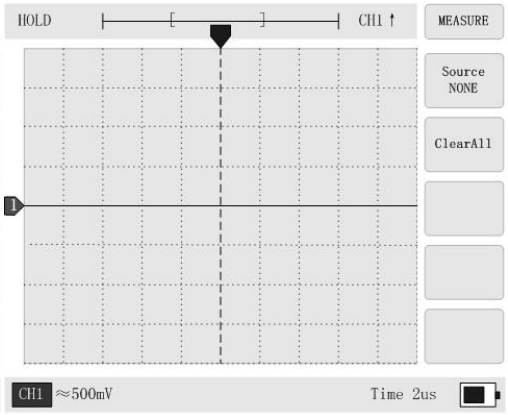


Figure 20 No Signal Measurement Interface

Operating description

The measurement display interface can be accessed by pressing the 测量 key, and the setting option can be changed by pressing the 翻页 key, then the setting content can be changed by pressing the 选项 key. Attention shall be paid that only three kinds of values can be measured simultaneously, if the fourth value is selected and measured, the measurement of the first value will be automatically turned to a situation without measurement.

3.5 Save function

Press the key of "保存"(save) to open the interface of "SAVE", as in Figure 21.Select the location (option to change), then select the save (option to perform), the waveform will be saved.

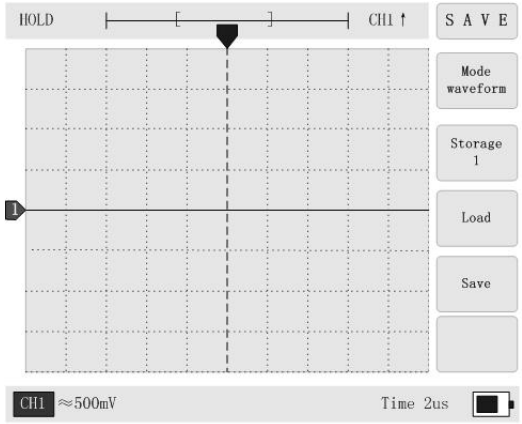


Figure 21: "SAVE" interface

Refer to **Table 12** for display menu.

Function	Setting	Explanation
Type	Waveform	Store or call out the waveform operation
	Setting	Store or call out the setting operation

Location	1、2 3、4 5、6	Designate memory location for saving/calling out waveform /setting data. This Scopemeter can store 6 groups of waveform and 1 group of setting, of which two channels of waveform data can be stored synchronously.
Call out		Call out the previously stored waveform /setting from the designated memory location.
Store		Store current waveform /setting in the designated memory location.

Directions:

Location: Designate memory location so as to store waveform, instrument setting or call out the waveform /setting from an appointed location.

Call out: Scopemeter can call out the stored waveform /setting from the designated memory location.

Storage: Store the current waveform /setting in the designated memory location.

3.6 REF function

During the actual testing process, the failure reason can be determined by using an Scopemeter to measure and observe the waveform of related subassemblies, and making a comparison between the waveform and the reference. This approach is more applicable where detailed reference waveforms for electric circuit action spot are provided.

The reference waveform menu can be displayed by pressing the REF key, as shown in Figure 22, and the setting description is shown in Table 13.

Table 13

Function	Setting	Description

Storage site	1, 2, 34, 5, 6	To select the waveforms at different storage sits as the reference
Storage status	Effective Ineffective	To display whether the current storage site has waveform data for reference or not
source selection	CH1 CH2	To select Channel 1 of the storage waveform as the reference To select Channel 2 of the storage waveform as the reference
Inversion	On Off	To set reference waveform to be in Inversion To close down inversion position

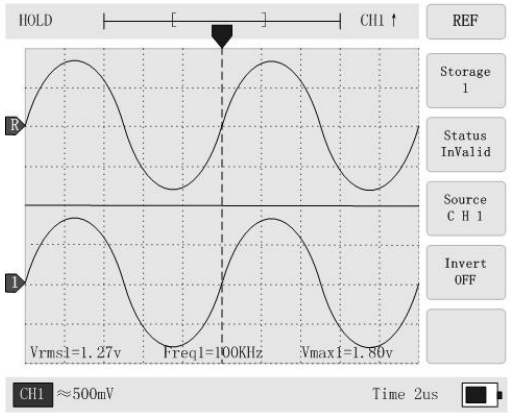


Figure 22 REF Display Interface

Operating instruction

1. Reference waveform menu can be displayed by pressing the REF key, and the storage site option can be accessed by pressing the 翻页 key, then the reference waveforms of different storage sites can be selected by pressing the 选项 key.
2. The storage position option can be accessed by pressing the 翻页（page down） key, and the storage position (effective or ineffective) can be selected by pressing the 选项 key.
3. The source selection option can be accessed by pressing the 翻页 key, and the CH1 or CH2 channel of reference waveform can be selected by pressing the 选项 key.
4. The scale of reference waveform can be adjusted to a proper position by pressing the V and mV keys.
5. The vertical position of reference waveform can be adjusted to a proper position by pressing the ↑ and ↓ keys. ,

Notice:

1. A storage with which the waveform is stored in the mode of X-Y is not applicable to reference waveform. In the state of REF menu, the storage site is displayed as “ineffective”.
2. The horizontal position and scale can’t be adjusted in the state of reference waveform.

Directions:

1. Location: some specific area for savage of waveform, named 1, 2, 3, 4, 5 and 6.

2. Load: some waveform stored to be restored to the memory from 1, 2, 3, 4, 5, or 6.
3. Save: not only waveform but also parameter can be saved.
4. Data upload: connect the host machine to the pc by a communication line, you can upload the waveform stored in the host machine, and save it for analysis (BMP format only)

3.7 Trigger function

Trigger function made it possible for observing some waveform, locking it, and displaying it steadily on the screen. Regular mode for trigger is auto, normal and once. Different mode it acts different,

Auto mode: display a steady waveform when meet the trigger condition or else display a unstable waveform.

Normal: display the steady waveform that meet the trigger condition.

Once: display the first steady waveform that meet the trigger condition.

Edge trigger is usual way of trigger. It comes from the comparison between input signal and the inner compare signal. You can set it the falling side or rising side.

Press the key of Trig+ to open the interface of trigger mode, as in Figure 23.

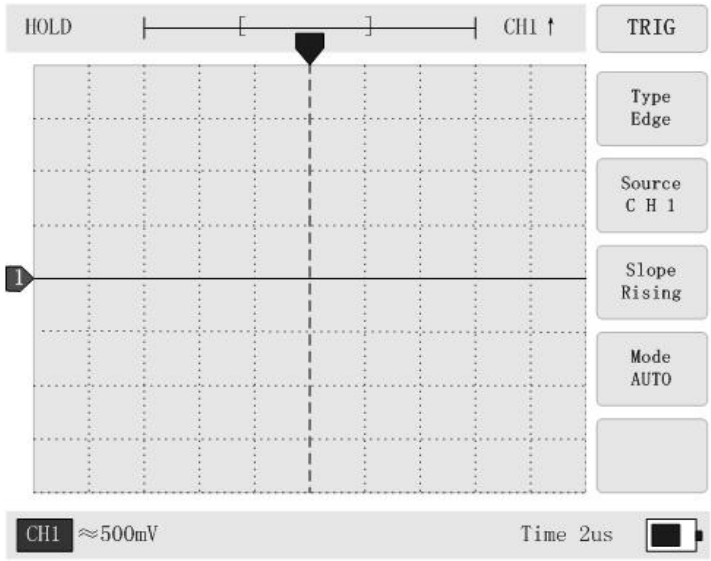


Figure 23: Trigger System Interface

See **table 14** for display explanation menu.

Function	Setting	Description
Edge type	Rising edge	Trigger at rising edge of signal

	Falling edge	Trigger can be done at falling edge of signal
	PAL field	PAL video trigger
	NTSC field	NTSC video trigger
source option	CH1	Set channel 1 as trigger signal
	CH2	Set channel 2 as trigger signal
Trigger mode	Automatic	To set in such a way that the sampling waveform is allowable even when detecting no trigger condition
	General	To set in such a way that sampling waveform is allowable only when trigger condition is satisfied.
	Single	To set in such a way that only one waveform can be sampled when detecting trigger, and then stop there.
	Synchronization	Synchronously sample waveform with synchronizing frequency of 45-50Hz which can be adjusted via the keys of "↑↓".

Here press the keys of ↑ ↓ to adjust trigger level.

Chapter IV

Multi meter

After power on (namely the initial status) press the 功能 key to enter the function menu, press 翻页 to select some menu listed on right, then press “portion” to perform the function you selected.

4.1 voltage measurement

Maximum input voltage： 600 Vrms CAT II, 300 Vrms CAT III。

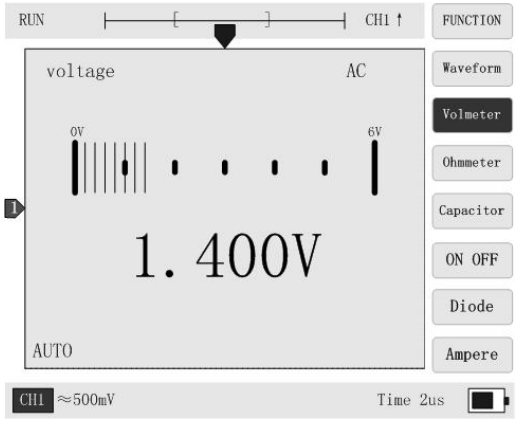


Figure 21 interface of voltage measurement

The main interface shows a simulation graph, measurement result lists below, measurement range lists left on the bottom.

Select “voltage ”Press “选项”(option) change between DC and AC. Press “V” get into

the manual mode, press "自动" (auto)return auto mode. The simulation graph gives a visualized measurement.

4.2 Resistance measurement

resistance measurement have six shift: 600Ω、6KΩ、60KΩ、600KΩ、6 MΩ、60 MΩ.

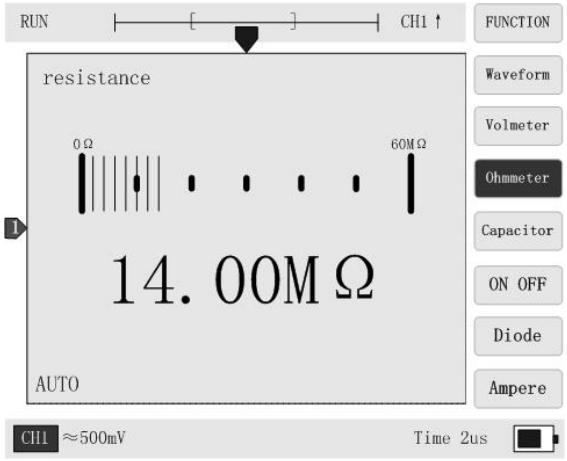


Figure 21 interface of resistance measurement

The main interface shows a simulation graph, measurement result lists below, measurement range lists left on the bottom.

Press "V" get into the manual mode, press "自动" (auto)return auto mode. The

simulation graph gives a visualized measurement

4.3 Capacitor measurement

Capacitor measurement has seven shifts. Range from 6.000nF to 6mF.

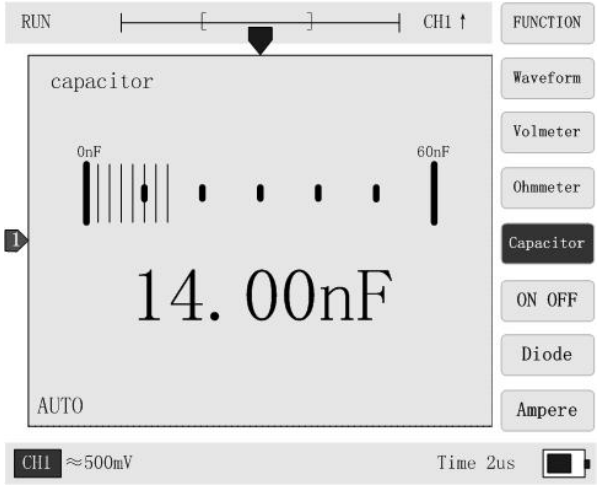


Figure 23 interface of capacitor measurement

The main interface shows a simulation graph, measurement result lists below, measurement range lists left on the bottom.

Press "V" get into the manual mode, press "自动" (auto)return auto mode. The simulation

graph gives a visualized measurement.

4.4 Make-and-break measurement

It measures at the shift 600Ω.

It beep if the result of measurement less than 25Ω.

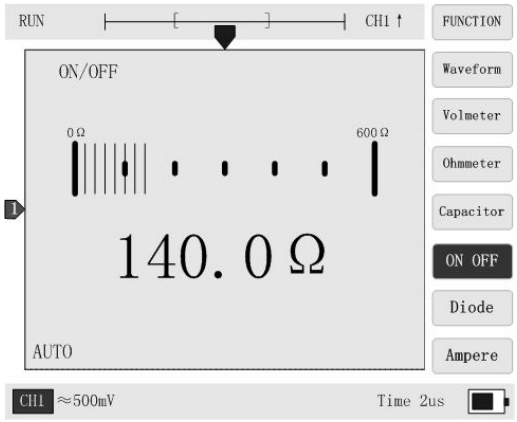


Figure 25 interface of make-and-break measurement

The main interface shows a simulation graph, measurement result lists below.

4.5 Diode measurement

It shows OL (overload) if the voltage drop is above 2V. And it beeps if the voltage

drop is less 0.25V. The simulation graph gives a visualized measurement.

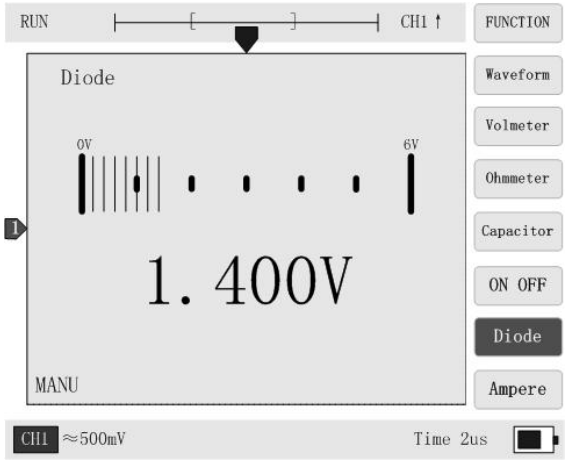


Figure 24：Interface of **diode measurement**

The main interface shows a simulation graph, measurement result lists below.

4.6 Current measurement

Current measurement have two shift: 60mA、600mA.

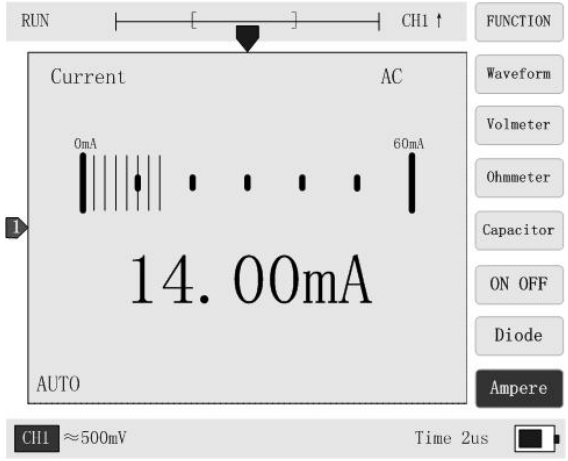


Figure 26：**Interface of current measurement**

The main interface shows a simulation graph, measurement result lists below, measurement range lists left on the bottom.

Select “current ”Press “选项”(option) change between DC and AC. Press “V” get into the manual mode, press “自动” (auto)return auto mode. The simulation graph gives a visualized measurement.

Appendix

Appendix A main specification

Specification of the Scopemeter

Specification of Scopemeter	
Bandwidth（-3dB）	20MHz
Sample	Max sample：80MSa/S
Channels	2
Couple	AC, DC or GROUND
Couple(AC)	< 10 Hz without probe < 1 Hz 10 MΩ 10:1 passive probe
Rise time	< 17.5 nS
Input independence	1MΩ，≤20pF
Max input voltage	1x CAT III 300 VAC 10x, 100x CAT III 600 VAC
Vertical resolution	8bit
Vertical sensitive	5mV/div-5V/div
Horizontal resolution	50nS/div
Horizontal sensitive	50nS-5S
Depth-sampling	4K/channel

Memory	6 waveform+1parameter
Trigger mode	Auto, normal, once
Trigger type	Edge trigger, video trigger
Basic characteristic	
Screen	320×240；backlight
Communication	RS232 PC software(showwave.exe)
Battery	3.7V lithium battery 4AH
Adapter	input：100VAC-240VAC output：5V**±10%**DC 1000mA
Size	118mm×200mm×45mm
Weight	690g

Performance of Scopemeter(zb-2201 only)	
Measuring range	6000
Input	Max input voltage: 600 Vrms CAT II, 300 Vrms CAT III。
On resistance	25Ω(at the shift of 600Ω), if less it beep
Diode measurement	>2V shows OL(overload)

	<0.25 beep
Capacitor measurement	6.000nF- 6mF (7 shifts)
Current measurement	60.00mA / 600.0mA (2 shift)
Resistance measurement	600.0Ω- 60.00MΩ (shift)
Voltage measurement	600.0mV- 6000V (5 shift) It shows OL if voltage is above 1000v at the shift of 6000V。

Specification:

(running at the temperature 10℃-25 ℃, 30 minutes after power on)

Specification of Scopemeter	
Vertical system: channels of Scopemeter	
Bandwidth（-3dB）	20MHz
Precision	10 mV/div to 20 mV/div: ± 5%
	50 mV/div to 5 V/div: ± 3%
offset on vertical (DC)	±0.2 div ±2 mV ±0.5% offset
Trigger sensitivity	DC to20 MHz: 0.8 div
Specification of probe	
Rising time	X1 23.3nS
	X10 17.5nS

Bandwidth	X1 DC-15MHz
	X10 DC-20MHz
Input impedance	X10 10M(without Scopemeter input resistance 1M)
Input capacitor	X1 46pF (without input capacitor of Scopemeter)
	X10 15pF more or less

Specification of Scopemeter(zb2201 only) ± (% of reading + % of range)

Function	**Range**	**Frequency, measure current, load voltage**	**Tcal± 5 ℃/(year)**
Voltage			
DC Voltage	600.0 mV		0.3 + 0.08
	6.000 V		0.3 + 0.08
	60.00 V		0.3 + 0.08
	600.0 V		0.3 + 0.08
AC Voltage	600.0 mV – 600.0 V	50 Hz – 1 kHz	1.0 + 0.2
		1kHz – 30 kHz	3.0 + 0.2
AC + DC	6.0000 V – 600.0	50 Hz – 1 kHz	1.0 + 0.2

Voltage	V		
		1kHz – 30 kHz	3.0 + 0.2
Impedance			
	600.0 Ω		0.5 + 0.2
	6.000 K Ω		0.5 + 0.2
	60.00 k Ω		0.5 + 0.2
	600.0 k Ω		0.5 + 0.2
	6.000 M Ω		0.5 + 0.2
	60.00 M Ω		1.0 + 0.2
current			
DC 电流	60.00mA		0.5 + 0.2
	600.0 mA		0.5 + 0.2
AC 电流	60.00mA – 600.0 mA	50 Hz – 1 kHz	1.0 + 0.2
		1kHz – 30 kHz	3.0 + 0.2
AC + DC 电流	60.00mA – 600.0 mA	50 Hz – 1 kHz	1.0 + 0.2
		1kHz – 30 kHz	3.0 + 0.2

Capacitor			
	60.00 nF		2.0 + 0.2
	600.0 nF		2.0 + 0.2
	6000 nF		2.0 + 0.2
	60.00 μF		2.0 + 0.2
	300.0 μF		2.0 + 0.2
diode			
2.000 V 0.5 mA		2.0 + 0.08	
Make-and-break			
<25Ω, it beep			

Appendix B Problem and resolutions:

1. power on without any response

Mostly it is the battery runs out, charge the battery for a while or fully charge it before use it again, or else it will not run either. If you can not run it, contact us instead.

2. Few seconds after power on it closed

Mostly it is the battery runs out, you can power on the host machine again, and have a look at the symbol of battery at the bottom; if it is not low in battery, charge it immediately

3. How to change between AC and DC

Press “option” at AC status, enter the DC status;

Press “option” at DC status, enter the AC status.

4. 10 times bigger or smaller than the actual voltage

Have a check of the “probe” sub option of the channel (CH1 OR CH2). Set it to the proper option such as x 10 or x 1.

5. Can not get steady waveform but a vary waveform shows.

Do some operation at the trigger mode;

Have a check of the “signal” sub option of the trigger, set it to the proper channel.

Have a check of the “type” sub option of the trigger, general signal select the edge trigger and video signal select the video trigger.

Have a try to change the “mode” sub option among auto, normal and once.

6. Can not communicate with PC

Have a check that the rs232 communication line links the host machine to the pc by COM1 or other, the software (showwave.exe) is running well on the PC, and have a right configuration such as COM1 or other.

7. The host machine is power on.

After get the graph of waveform, make sure the “location” is the one you want to be saved.

8. Baseline drift

When the machine is just power on, without any input signal, the baseline is off the middle screen (marked 0) quite a lot is the really drift. If the situation happens contact us for a resolution.

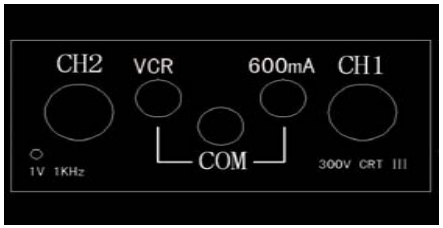
Appendix C Standard layout

The products contain the things list below:

#	description	amount	2201	2201S	optional
1	ZB-2201 host machine	1pcs	√		
2	ZB-2201S host machine	1pcs		√	
3	20M(10:1)probe	1pair	√	√	
4	Communication line	1pcs	√	√	
5	PC compact disk	1pcs	√	√	
6	《user manual》	1pcs	√	√	
7	Specific adapter	1pcs	√	√	
8	4000mAHlithium battery	1pcs	√	√	
9	《products guarantee card》	1pcs	√	√	
10	Probe (for direct measurement)	1pair	√		
11	knapsack	1pcs			√
12	100:1probe	1pcs			√

Appendix D Definition of interface

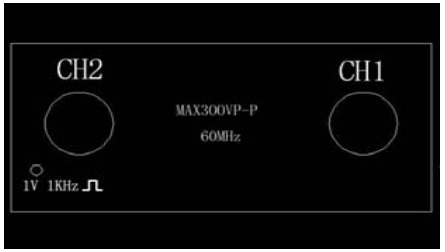
1、 interface for input (ZB-2201)



ZB-2201 interface for input

"CH1" means the first channel, "CH2" means the second channel, "R" means the resistance or voltage drop for the diode, "com" means the common, "1V 1KHz" is the signal output for test.

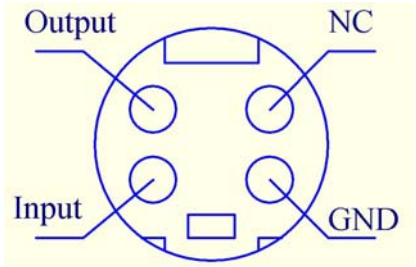
2、 interface for input (ZB-2201S)



ZB-2201S interface for input

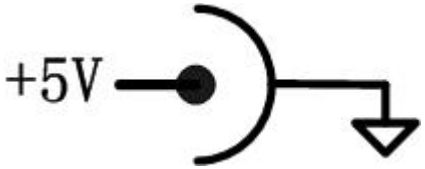
"CH1" means the first channel, "CH2" means the second channel, "1V 1 KHz" is the signal output for test.

3、 definition of the communication line:



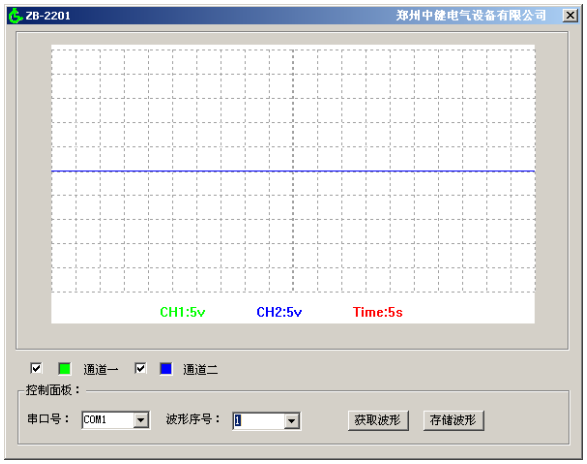
Definition of the communication line

4、Definition of the adapter interface:



Appendix E Instruction of the PC software for the Scopemeter

Interface of software



“通道一(CH1)、通道二(CH2)”：Show the waveform selected.

“串口号”： Serial port linked. (COM1, COM2, COM3, COM4)

“波形序号”： Waveform selected to upload.

“存储波形”：Save the waveform uploaded as bmp format.

“获取波形”：Upload some waveform stored in the host machine.

Usage：

link the host machine to the pc by the COM1(or others), power on the host machine, run the software on the pc(you can get it from the CD), press the button“获取波形”,after get the waveform, save it(bmp format), all is the process.

Definition of the adapter interface

株式会社秋葉原
http://www.akiba-tech.com